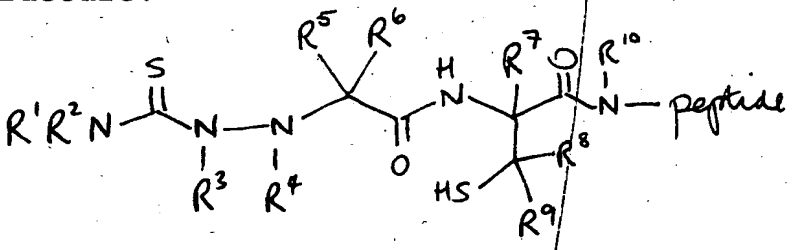
WHAT IS CLAIMED IS:

1. A peptide comprising a radiometal-binding moiety, wherein said binding moiety comprises the structure:



wherein R^1, R^2, and R^3 independently are selected from the group consisting of H, lower alkyl, substituted lower alkyl, cycloalkyl, substituted cycloalkyl, heterocycloalkyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, alkaryl, and a protecting group that can be removed under the conditions of peptide synthesis, provided that at least one of R^1, R^2, or R^3 is H,

R^4, R^5, R^6, R^7, R^8, R^9 and R^{10} independently are selected from the group consisting of H, lower alkyl, substituted lower alkyl, aryl, and substituted aryl, or R^4 and R^6 together optionally form a direct bond, and R^8 and R^9 together or R^7 and R^9 together may form a cycloalkyl or substituted cycloalkyl ring, and

wherein NR^{10} is located at the N-terminus of said peptide, or is located on an amino acid side chain of said peptide.

2. A peptide according to claim 1, wherein R^1 is H.

3. A peptide according to claim 1, wherein R^3 is H.

4. A peptide according to claim 1, wherein R^4 is H.

5. A peptide according to claim 1, wherein R^4 and R^6 together form a direct bond.

6. A peptide according to claim 5, wherein R^5 is H.

7. A peptide according to claim 1, wherein NR^{10} is located at the N-terminus of said peptide.

8. A peptide according to claim 1, wherein NR^{10} is located on an amino acid side chain of said peptide.

9. A peptide according to claim 2, wherein R^2 is lower alkyl or substituted or unsubstituted phenyl.

10. A peptide according to claim 9, wherein R^2 is H.

11. A peptide according to claim 10, wherein R^3 is H.

12. A peptide according to claim 11, wherein R^4 and R^6 together form a direct bond.

13. A peptide according to claim 12, wherein R^5 is H.

14. A peptide according to claim 13, wherein R^7, R^8, and R^9 each are H.

15. A peptide according to claim 14, wherein R^2 is phenyl.

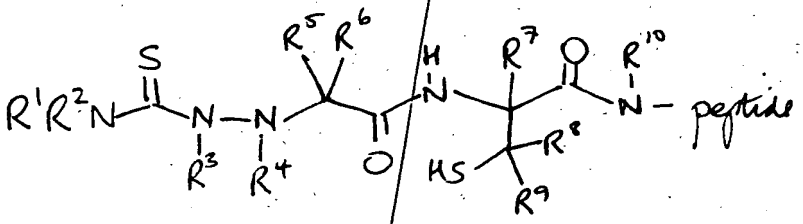
16. A peptide according to claim 14, wherein R^2 is methyl.

17. A peptide according to claim 1, wherein R^8 and R^9 are methyl.

18. A peptide according to claim 1, further comprising a bound metal atom.

19. A peptide according to claim 18, wherein said metal atom is selected from the group consisting of ^{99m}Tc, ^{186}Re, and ^{188}Re.

20. A method of preparing a metal-chelating composition, comprising contacting a solution of a peptide comprising a radiometal-binding moiety with stannous ions, wherein said binding moiety comprises the structure:



wherein R^1, R^2, and R^3 independently are selected from the group consisting of H, lower alkyl, substituted lower alkyl, cycloalkyl, substituted cycloalkyl, heterocycloalkyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, alkaryl, and a protecting group that can be removed under the conditions of peptide synthesis, provided that at least one of R^1, R^2, or R^3 is H,

R^4, R^5, R^6, R^7, R^8, R^9 and R^{10} independently are selected from the group consisting of H, lower alkyl, substituted lower alkyl, aryl, and substituted aryl, or R^4 and R^6 together optionally form a direct bond, and R^8 and R^9 together or R^7 and R^9 together may form a cycloalkyl or substituted cycloalkyl ring, and

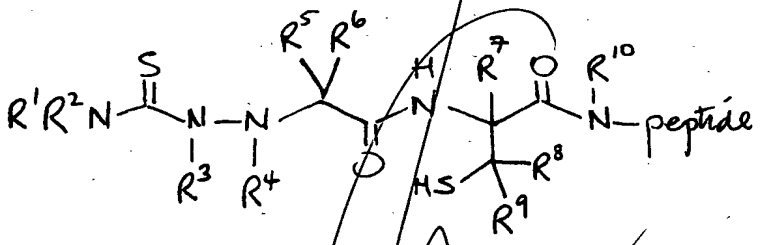
wherein NR^{10} is located at the N-terminus of said peptide, or is located on an amino acid side chain of said peptide,

and then contacting said solution with a radionuclide and recovering the radiolabeled peptide.

21. The method of claim 20, wherein said radionuclide is selected from ^{188}Re- or ^{186}Re-perrhenate and ^{99}Tc-pertechnetate.

22. A method of imaging a tumor, an infectious lesion, a myocardial infarction, a clot, atherosclerotic plaque, or a normal organ or tissue, comprising administering to a human patient a radiolabeled peptide, together with a pharmaceutically acceptable carrier, and, after a sufficient time for said radiolabeled peptide to localize and for non-target background to clear, the site or sites of accretion of said radiolabeled peptide are detected by an external imaging camera,

wherein said radiolabeled peptide is prepared by contacting a solution of a peptide with stannous ions, wherein said peptide comprises a radiometal-binding moiety comprising the structure:



wherein R^1, R^2, and R^3 independently are selected from the group consisting of H, lower alkyl, substituted lower alkyl, cycloalkyl, substituted cycloalkyl, heterocycloalkyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, alkaryl, and a protecting group that can be removed under the conditions of peptide synthesis, provided that at least one of R^1, R^2, or R^3 is H,

R^4, R^5, R^6, R^7, R^8, R^9 and R^{10} independently are selected from the group consisting of H, lower alkyl, substituted lower alkyl, aryl, and substituted aryl, or R^4 and R^6 together optionally form a direct bond, and R^8 and R^9 together or R^7 and R^9 together may form a cycloalkyl or substituted cycloalkyl ring, and

wherein NR^{10} is located at the N-terminus of said peptide, or is located on an amino acid side chain of said peptide,

and then contacting said solution with a radionuclide and recovering the radiolabeled peptide.

23. A peptide according to claim 1, wherein said peptide is selected from the group consisting of:
(Chel)γAbuNle$\underline{DHF_dRWK}$-NH_2,
(Chel)γAbuHSDAVFTDNYTRLRKQMAVKKYLNSILN-NH_2,
KPRRPYTDNYTRLRK(Chel)QMAVKKYLNSILN-NH_2,
(Chel)γAbuVFTDNYTRLRKQMAVKKYLNSILN-NH_2,
(Chel)γAbuYTRLRKQMAVKKYLNSILN-NH_2,
HSDAVFTDNYTRLRK(Chel)QMAVKKYLNSILN-NH_2,
<GHWSYK(Chel)LRPG-NH_2, <GHYSLK(Chel)WKPG-NH_2,
$AcNal_dCpa_dW_dSRK_d$(Chel)$LRPA_d$-NH2 ,
(Chel)γAbuSYSNleDHF$_d$RWK-NH_2, (Chel)γAbuNle$\underline{DHF_dRWK}$-NH_2 ,
(Chel)Nle$\underline{DHF_dRWK}$-NH_2 ,
Ac-HSDAVFTENYTKLRK(Chel)QNleAAK$\underline{KYLND}$LKKGGT-NH_2,
(Chel)γAbuHSDAVFTDNYTRLRKQMAVKKYLNSILN-NH_2,
(Chel)γAbuVFTDNYTRLRKQMAVKKYLNSILN-NH_2,
(Chel)γAbuNle$\underline{DHF_dRWK}$-NH_2^c, <GHWSYK(Chel)LRPG-NH_2,
<GHYSLK(Chel)WKPG-NH_2, $AcNal_dCpa_dW_dSRK_d$(Chel)$LRPA_d$-NH_2,
<GHYSYLK(Chel)WKPG-NH_2, <GHYSLK(Chel)WKPG-NH_2,
$Nal_dCpa_dW_dSRK_d$(Chel)WKPG-NH_2, <$GHWSYK_d$(Chel)LRPG-NH_2,
$AcNal_dCpa_dW_dSRK_d$(Chel)$LRPA_d$-NH_2,
$AcNal_dCpa_dW_dSRK_d$(Chel)$LRPA_d$-NH_2,
$AcNal_dCpa_dW_dSRK_d$(Chel)$LRPA_d$-NH_2, <GHWSYK(Chel)LRPG-NH_2,
AcK(Chel)$F_d\underline{CFW_dKTCT}$-OH, AcK(Chel)$DF_d\underline{CFW_dKTCT}$-OH,
AcK(Chel)$F_d\underline{CFW_dKTCT}$-ol, AcK(Chel)$DF_d\underline{CFW_dKTCT}$-ol,
(Chel)$DF_d\underline{CFW_dKTCT}$-OH, K(Chel)$DF_d\underline{CFW_dKTCT}$-ol,
K(Chel)KK$F_d\underline{CFW_dKTCT}$-ol, K(Chel)K$DF_d\underline{CFW_dKTCT}$-OH,
K(Chel)DS$F_d\underline{CFW_dKTCT}$-OH, K(Chel)$DF_d\underline{CFW_dKTCT}$-OH,
K(Chel)$DF_d\underline{CFW_dKTCD}$-$NH_2$, K(Chel)$DF_d\underline{CFW_dKTCT}$-$NH_2$,
K(Chel)K$DF_d\underline{CFW_dKTCT}$-$NHNH_2$, AcK(Chel)$F_d\underline{CFW_dKTCT}$-$NHNH_2$,
K(Chel)$F_d\underline{CFW_dKTCT}$-ol, and $F_d\underline{CFW_dKTCT}$K(Chel)-NH_2,
wherein (Chel) is said radiometal-binding moiety.